

What is claimed is:

- 1 1. A system for interacting with displays and all devices that use
2 such displays comprised of
3 a. a display,
4 b. a sensor or camera,
5 c. a pointing device that can be registered by the sensor or
6 camera,
7 d. a method for detecting the pointing device,
8 e. a method for establishing the mapping between the position of
9 the pointing device and a corresponding location on the display.
- 1 2. A system according to claim 1 wherein the sensor or camera,
2 in addition to registering the image of the pointing object, can also register at least
3 one of (i) the image of the display and (ii) the reflection or effect that the pointing
4 device can produce on the display.
- 1 3. A system as defined by claim 1 which commands the
2 positioning of a pointing icon on the display.
- 1 4. A system according to claim 1 wherein the pointing device is a
2 part of the human body such as a hand or a finger, or an ornament or device worn on
3 the human body such as a glove or thimble.
- 1 5. A system according to claim 1 wherein the pointing device is
2 used to point to regions of the display by way of changing its position,
3 attitude, or presentation.
- 1 6. A system according to claim 1 wherein the pointing device is
2 used to define a particular point or region on the display.

1 7. A system according to claim 1 wherein the pointing device is
2 used to define a vector on the plane of the display that indicates a direction
3 and magnitude relative to or with respect to an item on the display or a
4 region of the display.

1 8. A system according to claim 3 wherein the pointing icon on
2 the display can be registered by the sensor or camera.

1 9. A system according to claim 8 which also includes a method
2 for correcting the offsets between (i) the position of the pointing device, or reflection,
3 or effect thereof on the display as observed by the user or by the sensor or the camera,
4 and (ii) the position of the pointer icon on the display.

1 10. A system as defined by claim 1 which also includes at least
2 one of the following:

3 a. a method for selecting or highlighting a specific item or icon
4 on the display,

5 b. a method for activating a specific process, program, or menu
6 item represented on the display, and

7 c. a method for writing, scribing, drawing, highlighting,
8 annotating, or otherwise producing marks on the display.

1 11. A method for detecting the pointing device comprising

2 a. retrieval of data or image from a sensor or camera, and

3 b. analysis of the data or image from the sensor or camera to
4 locate the pointing device in the data, or locating at least a set of the picture elements
5 in the image that comprise the rendition of the pointing device.

1 12. A method according to claim 11 wherein the characteristics
2 that distinguish the pointing device from other objects in the data from the

3 sensor or the image from the camera are known a priori.

1 13. A method according to claim 11 wherein the characteristics
2 that distinguish the pointing device from other objects in the data from the sensor or
3 the image from the camera are determined based analysis of at least one set of the
4 data acquired from the sensor or one image acquired from the camera.

1 14. A method according to claim 13 wherein the characteristics
2 that distinguish the pointing device from other objects, whose rendition are present in
3 the data from the sensor or in the image from the camera, is obtained by

4 a. acquiring at least two sets of data from the sensor or at least
5 two images from the camera, one with the pointing device in view of the sensor
6 or the camera and one without, and

7 b. comparing the two sets with one another.

1 15. A method according to claim 11 wherein adjustments or
2 modifications are made to the position, sensitivity, and other settings of the sensor or
3 the camera pursuant the analysis of the data or image retrieved from the sensor or the
4 camera.

1 16. A method according to claim 11 wherein at least part of the
2 procedures for the method is carried out using at least in part the computing
3 mechanisms available on one or more of the following: the display, or the sensor or
4 camera, or the pointing device, or the device producing the signal shown on the
5 display, or the device producing the pointing icon on the display.

1 17. A method for establishing the mapping between the set of
2 positions that a pointing device can take and the set of corresponding locations on the
3 display comprising:

4 a. defining the range of positions that the pointing device can

5 assume,

6 b. defining the boundaries of the range of positions that the
7 pointing device can take with geometric representations,

8 c. transforming the geometric representation of the arrangement
9 of regions on the display so that it fits optimally into the boundaries of the range of
10 positions that the pointing device can take.

1 18. A method according to claim 17 wherein the range of positions
2 that the pointing device may assume is defined by querying the user to point to a set
3 of points on the display.

1 19. A method according to claim 18 wherein the range of positions
2 that the pointing device can assume is defined by the boundary contours of the
3 display as they are registered by the sensor or the camera.

1 20. A method according to claim 19 wherein at least one special
2 display image is used to establish the mapping between the positions that a pointing
3 device can take and a corresponding locations on the display.

1 21. A method according to claim 17 wherein at least part of the
2 procedures for the method is carried out using at least in part the computing
3 mechanisms available on one or more of the following: the display, or the sensor or
4 camera, or the pointing device, or the device producing the signal shown on the
5 display, or the device producing the pointing icon on the display.

1 22. A method for detecting the display comprising
2 a. retrieval of data or image from a sensor or camera, and
3 b. analysis of the data or image from the sensor or camera to
4 locate the display in the data, or locating at least a set of the picture elements in
5 the image that comprise the rendition of the display in the image.

1 23. A method according to claim 22 wherein the characteristics
2 that distinguish the display from other objects in the data from the sensor or the
3 image from the camera are known a priori.

1 24. A method according to claim 22 wherein the characteristics
2 that distinguish the display from other objects in the data from the sensor or the
3 image from the camera are determined based on analysis of at least one set of the data
4 acquired from the sensor or one image acquired from the camera.

1 25. A method according to claim 22 wherein the display refers to
2 the range of positions that the pointing device can take.

1 26. A method according to claim 24 wherein the characteristics
2 that distinguish the display from other objects, whose rendition are present in the data
3 from the sensor or in the image from the camera, is obtained by

4 a. acquiring at least two sets of data from the sensor or at least
5 two images from the camera, one with the display off in view of the sensor or the
6 camera and one with the display on, and

7 b. comparing the two sets with one another.

1 27. A method according to claim 22 wherein adjustments or
2 modifications are made to the position, sensitivity, and other settings of the sensor or
3 the camera pursuant the analysis of the data or image retrieved from the sensor or the
4 camera.

1 28. A method according to claim 22 wherein at least part of the
2 procedures for the method is carried out using at least in part the computing
3 mechanisms available on one or more of the following: the display, or the sensor or
4 camera, or the pointing device, or the device producing the signal shown on the

display, or the device producing the pointing icon on the display.